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J. E. Fracetik (Laboratory for Plenatory Armsphorgen, MERICOSCAPE Space Vilght Conter, Transholt, MD (1971) B. D. Nidane and J. M. Motalli Admirestrational Contest.

J. B. Sectal?

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plats above, a greated agreement although the

Irradiance measurements have large error bers near the centers of the absorption bands. The results imply that the 184-200 nm solar irradiance which penetrates to the atratosphere can be computed to an accuracy of ±10 percent or better using presently available cross-sections. (Solar Irradiance, absorption).

J. Geophys. Res., Oran Penet 181018

O499 General or miscultaneous
HASUREMENT OF VOLT/NETER VERTICAL ELECTRIC FIRLDS
IN THE MIDDLE ANNOSPHERE
B. C. Haynard (Laboratory for Extraterrestrial
Physics, Godderd Space Flight Center, Greenbelt,
10 20771), C. L. Croskey, J. D. Mitchell and L.
C. Maje (Lonsaphere Research Laboratory, The
Francy Ivania State University, University Park, PA
16802).

16802). A test flight for a series of middle stmomphere slactfodynamics rockets was launched from Wellops Island, Virginia, at 7:18 EST on July 31, 1980. The mother-daughter configuration contained a three axis symmetric double probe electric field instrument and a blunt probe on the daughter payload, and a Gerdien condenser and a single axis (vertical) asymmetric double probe electric field instrument on the mother payload. The payloads ratched an apones of ill be, and date were guthered from all instruments on the downleg. A downward vertical electric field with a maximum capilitude of about 4 V/m was observed in a layer seplitude of about A V/m was observed in a layer between about 17 and 67 km. The integrated patential across this layer was approximately 20 kV. Conductivity measurements indicated that from electrons were sheen from the region of large electric fields; however, the decrease in conductivity was insufficient to maintain vertical current continuity through the layer. These results satablish the existence of large results satablish the existence of large results satablish the existence of large results satables that the maintain supporting previous results from single axis measurements.

Geophys. Res. Lett., Paper 11,1136

Exploration Geophysics

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N. AfLah Also (Western Geophysical Company, \$55

London Road, Islaworth, Hiddlesex, England) Charles

In the Grav-Schmidt orthogonalization procedure is

simplified under the Manusciption of stationarity and

implemented to perform recursive predictive decon
volution. This process is called the orthonormal

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O990 Instruments
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LOGGING WITH LAMMA RAYS
See 3585 X rays, agams rays, and cosmic rays
W. Bortoszi (Department of Physica, Massachusetts
Institute of Technology, Cachridge, MA 02139) D. V.
Ellis, and J. S. Wahl
We davalog a theory for the gamms-ray spectrum in
a scattaring and absorbing medium. Espressions are
derived for the spectrum when sources are uniformly
distributed in an infinite medium. We agrees the
view that the formation of the spectrum at a point
is a local phenomenon, originaling from the Compton
degradaction of high-energy physones which are transported from the source to the seighborhood of the
point of interest. This ellows one to apply the
theory to a point source in an infinite medium, as
well as to a geometry appropriate for well logging
Confirming evidence via Monte Carlo results and
experiment is prosented. We show an application to
a well logging device for measurement of gamma-ray
absorption via the photoslectric affect, a pagemeter which is sensitive to lithology.
GDOPHYSICS, vol. 46, no. 10

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ROOSEVELT HOT SPRINGS GROTHERMAL AREA, UTAM, COINS
TELESTERIC P-MAYE DATA
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Russell Robinson (Goophysics Division, Dair, Bax
1220, Wellington, New Zealand) H. N. Tyar
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ISEE 3 in Real Time: An Update

J. A. Joselyn, J. Hirman, and G. R. Heckman

NOAA/Space Environment Laboratory Roulder Colorado

In the October 9, 1979 Issue of Eos, Tsurulani and Baker [1979] expressed the tangible benefits of obtaining selected interplanetary data from the ISEE 3 spacecraft in real time. As shown in Figure 1, reproduced from Tsurutani and Baker, ISEE 3 is positioned between the earth and the sun in a halo orbit about the sun-Earth libration point. This location is well suited to provide advanced warning of the onset of geomagnetic disturbances. Although the data were not originally intended for real-time use, NOAA and NASA began to cooperate early in 1979 to solve the technical and administrative problems requisite to acquiring the raw data before editing and transmission to the experimenters. In March 1980 the data stream began arriving at the Space Environment Services Center (SESC), Boulder, Colorado. Dally data coverage varies but averages near 80%. The data are now being routinely used to support SESC military and civilian customers and the scientific community at

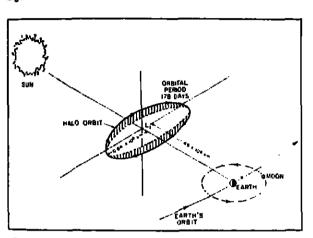


Fig. 1. The International Sun Earth Explorer 3 orbit about the sun-Earth libration point L_1 .

SESC (a joint operation of NOAA and the Air Force Air Weather Service) is an around-the-clock center that closely monitors solar and geophysical conditions, issues warnings and alerts of special events, and writes twice-daily summaries and forecasts of the overall level of activity. Realime and near-real-time data are routinely obtained from a thein of cooperating solar optical and radio observatories, including the remaining stations of the International Magnelospheric Study Program. Although Interplanetary data have been provided in the past by Pioneers 6-9 and Vela spacecraft, and are now available by request from the princhal investigators of Pioneers 6-9 and the Pioneer Venus Orbiter (depending upon a favorable location of Venus), ISEE 3 provides a vital platform for measuring ambient conditions in the solar wind some tens of minutes before Earth is impacted. In the past few months, this capability was especially helpful in providing support to NASA for the first flight of the shuttle Columbia and to the international European Energy Budget Campaign organized by D. Offer-

Table 1 lists the experiments and the principal investigafors who have released their data to NOAA specifically for real-time use. Additional details about the experiments are ontained in a special issue of the IEEE Transactions on Geoscience Electronics [IEEE, 1978]. The raw data enter he SESC data base, SELDADS (Space Environment Laboralory Data Acquisition and Display System), via relay nom NASA's Goddard Space Flight Center through NOAA's National Environmental Satellite Center. At SESC the data are processed, stored, and displayed in several ormats. Beside appearing on continuous paper strip charts, the digital data are flashed on a monitoring screen that is updated to current values every 6 s. As the data are ^{8d} and displayed, simple analysis is done to show the last clock time at which the interplanetary field turned southward plus a rough integration (gamma minutes) to help the forecaster evaluate how strong and persistent any outhward field has been. The calculated velocity of the soar wind is used to show an estimated heliolongitude of the Source of the solar wind, and there is an automatic shock delection message based on near-simultaneous increases of more than 50% in total magnetic field intensity and solar and density and at least 50 km/s in velocity. The data reding in the SESC/SELDADS are available for printout and plois on variable time scales. In particular, the southward component of the interplanetary field can be displayed in wo coordinate systems: solar ecliptic coordinates and solar nagnetospheric coordinates. The algorithms for the latter ransformation were provided by Roy Okida and Bruce Tsurulani of the Jet Propulsion Laboratory, California instilute of Technology.

At present the data are being used at three operational wels, On a routine level the ISEE 3 X ray detectors pro-Wide a valuable backup and extension of data received from NOANGOES satellites. Table 2 lists the energy ranges of the real-time ISEE 3 X ray channels and the NOAA/GOES, thannels thannels. The intensity of the X ray flux at energies greater than 20 keV has been shown to be an indicator of the production of solar protons [Lin and Hudson, 1976]. The Interplanetary plasma and magnetic field data provide valuable

| TABLE 1. ISEE 3 Data Acquired in Real Time | | | | |
|---|---|---------------------------|--|------------------------------|
| Experiment | Principal Investigator | Approximate Sampling Rate | 1-min Data Base Values | Acquisition Da |
| Solar X rays Interplanetary Magnetic Fields | K. A. Anderson, Univ. of Calif. E. J. Smith, JPL | 120/min 360/min | Peak; average median Average median | March 21, 19 March 21, 19 |
| Solar Wind Density, Velocity | S. J. Bame, Los Alamos Scientific Lab | 1/1.5 min | Sampled value | March 15, 19 |
| Plasma Wave (3 kHz) Electric Fleids | F. L. Scarf, TRW | 120/mln | Peak; average median | March 21, 198 |
| | | | | |

synoptic information. The general azimuthal direction of the magnetic field (e.g., toward or away from the sun) and the velocity are used in comparison with solar disc magnetograms from the Kitt Peak National Observatory to determine the large-scale source of the solar wind. Sector boundaries and other discontinuities in the direction of the solar wind are especially obvious. High-speed, low-density solar wind streams can be identified with specific coronal holes observed in helium 10830-A spectroheliograms transmitted daily from Kitt Peak.

At an event-mode level, the ISEE 3 solar wind data can identify abrupt interfaces and shock waves in the solar wind. When these shocks impact the magnetosphere, they are seen at geosynchronous satellite and low-latitude ground-based geomagnetic observatories as sudden impulses in the horizontal component, which may be storm sudden commencements. Figure 2 illustrates a sequence of observations on July 17, 1980. The discontinuity in the total interplanetary magnetic field at ISEE 3 occurred at 1840 UT (solar wind density and velocity data were not available). Previous to the detection of this shock, we had noted enhanced noise in the 3-kHz plasma wave experiment. Those emissions are due to instabilities driven by energetic protons flowing upstream of the shock and are often seen to precede intervals of shocked or highly disturbed conditions in the solar wind [Scari, 1977; Kennel et al., 1981]. Fifty minutes later, at 1930 UT, the impulse was reg-Istered at the low-latitude IMS stations. The delay time for the distance from ISEE to Earth of 1.5 × 106 km implied an assumed constant shock velocity of 500 km/s and an extrapolated delay from the sun to Earth of 3.5 days. This travel time corresponds with the occurrence of an X1/1 bright flare on the sun on July 14 at 0830 UT. From March 21, 1980, through April 30, 1981, 30 apparent shocks at ISEE 3 have been identified with sudden impulses on the ground. Twenty-three impulses in the geomagnetic field occurred at times when ISEE 3 data were not available. However, not all shock signatures seen at ISEE 3 can be identifled with magnetic impulses at Earth, and not all sudden impulses on the ground can be identified in ISEE 3 data. Many shocks cannot be readily associated with a specific flare or other solar event, such as a filement disappearance. Further, the details of the shock at ISEE 3 do not seem to correspond with the details of the impulse at the ground. This variety in the event data exemplifies the complexity of the solar wind and the interaction between the solar wind and the magnetosphere.

Finally, the ISEE 3 solar wind data are a potentially quantitative predictor of geomagnetic storms and substorms. The key to quantitative prediction is an understanding of the mechanism of energy coupling between the solar wind and the magnetosphere. Numerous algorithms relating solar wind parameters to geomagnetic indexes have been proposed. (For discussions, see Crooker [1975]; Russell [1980]; and Donnelly [1979].) We have presently implemented only two of these predictors. The first algorithm is Arnoldy's [1971] integration of the southward component of the interplanetary field. As explained above, this value is

TABLE 2. ISEE 3 and NOAA/GOES X ray Data

| Data Channel | Energy Range |
|--------------|--------------|
| | ISEE-3 |
| SC 1 | 12-20 keV |
| SC 2 | 20-36 keV |
| SC 3-4 | 36-52 keV |
| No. | DAA/GOES |
| 'long' | 1.5-12 keV |
| 'short' | 3-24 keV |

calculated as a simple summation of the magnitude of the southward field and is displayed in units of gamma minutes in real time. The integration is terminated during those times when ISEE data are not received or when B_s turns northward, restarting when the data resume. Although no permanent record of this parameter has been kept, it has proved to be of value as an indicator of the intensity of geomagnetic activity. Our experience is in accordance with the well-known result that predominately northward fields are associated with very little geomagnetic activity; fluctuating fields are associated with minor disturbances; consistently southward fields are associated with active conditions (K values at Boulder of 3, 4, and occasionally 5); and strong southward fields ($B_z > -10 \text{ y}$ and $\Sigma B_z l > 1000 \text{ y}$ min) are associated with storm levels. After a disturbed period, if the field turns and stays northward, magnetic activity diminish-

A second parameter presently calculated and displayed is epsilon, a function first suggested by Perreault and Akasofu [1978] that is proportional to solar wind velocity and the square of the total interplanetary field and is strongly weighted toward southward fields. Detailed studies of this parameter relate it to AE, which is a global measure of geomagnetic activity substorms in the northern auroral zone. AE is not available in real time, even as an estimate since SESC auroral zone observatories are concentrated in Alaska, with our easternmost data arriving as a summary report every 90 min from Upper Heylord, England, Nevertheless, epsilon performs as a reasonable estimator of geomagnetic activity in that values greater than the threshold of 1018 erg/s are associated with significant geomagnetic activity [Akasofu, 1980]. There are other functions of interplanetary parameters that have been suggested as predictor algorithms. Although most are intended to provide warnings on the order of tens of minutes (i.e., the travel time from ISEE 3 to Earth plus some additional lag time for substorms), some can offer predictions of up to hours. These include the 3-kHz plasma wave noise observations mentioned above and subtle density and velocity variations that may signal the approach of a stream interface region in the solar wind (Gosling et al. [1978]; R. L. Rosenberg, private communication, 1980).

In summary, SESC greatly appreciates the spirit of exploration and cooperation that led to the acquisition of the real-time interplanetary data from ISEE 3. We are using



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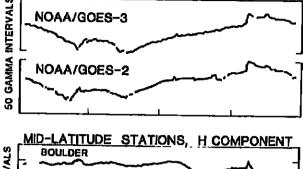
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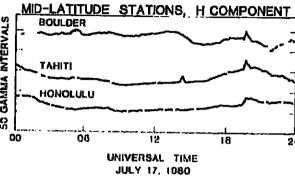


Fig. 2. A sequence of observations showing evidence of an interplanelary shock at ISEE 3 and then at Earth.

these data to support scientific research and provide warnings to commercial and military customers. The potential contained in the data is not yet fully realized, but we are implementing suggestions and algorithms to the best of our ability. For additional information about real-time data services, please contact the authors at the address given



The Weekly Newspaper of Geophysics

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Cover. In the new AGU publication, 'Earthquake Prediction-An International Roview, K. Mogi describes the progress of the extensive Japanese program in earthquake prediction which began in 1965. As part of this program, observations of various geodetic. geophysical, and geochemical parameters are being made throughout Japan in order to monitor premonitory effects of earthquakes, including crustal deformation (a-strain and tilt meters, b—Iriangulation, o—leveling, e—tide gages) and selemicity (d—selemic stations of the Japan Meteorological Agency, f—microearthquake networks). See page 619 for details.

Acknowledgments

The ISEE 3 data stream and present state of analysis could not have been possible without the personal attention of the following individuals. Their assistance is gratefully acknowledged: C. E. Hornback and the entire staff of the NOAA/SEL Real Time Data Services, especially including R. Hines; J. D. Schroeder, Ill; L. Thomas; J. Abeyta; D. Wasmundt; and A. Gray; R. Wales and J. Spohr of NASA/GSFC Satellite Operations; B. Tsurutani, J. Wolf, and A. Frandsen of JPL; W. C. Feldman, R. Anderson, and E. Tech of LASL; P. Harvey, H. Primbsch, and S. Kane of the University of California; F. L. Scarl and W. Taylor of TRW; S.-I. Akasofu of the University of Alaska; and R. Donnelly of the NOAA/Space Environment Laboratory.

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News

Magnetic Monopole

The magnetic monopole, or magnetic point source (as opposed to the conventional concept of a north-south magnetic dipole), is again in the news, as it has been off and on for the past 50 years. Perhaps it is more precise to say that another episode in the continuing search for the elusive monopole is underway.

In a recent report by the National Science Foundation (Mosaic, 12, 1981, p. 19) it was stated of the monopole, 'If there is a dogma in modern physics, it might be that in na-ture anything not expressly forbidden to exist by a specific law must be presumed to exist. . . . Physicists are just going to have to get clever enough to find them.' In the eyes of the numerous investigators who have searched, monopoles are not just objects that exist by theoretical default, they are arcane, perhaps, but real.

In the lore of science lantasy, monopoles are like antigravitation machines in magnetic fields. The theory is that a monopole draws energy from and destroys magnetic fields. in a press interview held in Houston at a lunar science conference a few years ago, geophysicist Buford Price of the University of California (Berkeley), who was then and is now involved in the search for the monopole, made the alarming statement that a controlled monopole might make a good 'ray gun' for spacemen. The hard facts are that through the years Price and others have searched for the monopole as the 'missing link' in electrodynamic theory. Its existence would provide the essential balance needed for Maxwell's equation.

In 1931, Paul Dirac wrote a prediction theory for the magnetic quantum, the monopole. The theory was logical, but the monopole was elusive as it turned out. Investigators had no luck in their search for the monopole; it was to be 30 years before a significant effort was made. In the early 1960's, field men doing geology and geophysics research in the Adirondaks ied a team of investigators through iron deposits as part of a new search of Iron-bearing natural materials (minerals, rocks, meteorites). The idea was to attract any monopoles into a portable electromagnetic field and onto an emulsion detector. The monopoles, it was thought, would have lodged in the weak fields of an ironrich material, after having been created in the upper atmo-sphere by collisions of atmospheric molecules with high-energy cosmic rays. The results were negative. With similarly negative results, millions of cubic centimeters of ocean waler were tested at the Fermi Leboratory in Batavia, Illinois,

and tests were conducted in the atmosphere with balloons. Now the search has separated into two lines of pursuit: creating a monopole in the laboratory and searching in space. Bulord Price and his coworkers are using the particle-track techniques, of which he was a coinventor, to detect monopoles that may have been created during particle annihilation experiments at SLAC (Stanford Linear Accelerator Center). The detectors are set up along the positronelectron ring at SLAC to make observations during particle collisions of several tens of bi illons of electron volts. The hope is that monopoles can be created in this energy

The search in space includes an examination of pulsars, and the effects that could have been caused by monopoles produced by high-energy collisions at a pulsar's surface. The appropriate polarity of monopole would drive into the parent pulsar, and being of sufficient number, would slow down the pulsar's rotation. The opposite polarity monopole would drive into space, and according to the processes, both north and south polarizations could accelerate into the

cores of planets (once they made it into the galaxies). According to theory, monopoles can be large, even immense. The mass equivalent per particle of the large ones could be on the order of 1020 eV. If entrapped in a planet's core, Immense monopoles could effect the release of an appreciable amount of heat. What else they could do is in the realm of speculation.

The existence of the monopole is not required to explain magnetic or electromagnetic processes per se; they are necessary only to complete the symmetry of Maxwell's theory. There may be a range of sizes of the monopole, from the orderly size of 1 or 2 lens of electron volts to the gigantio. They may be hard to detect because conventional theory is inadequate to describe their properties. The search continues, nonetheless, and Price and others associated with the current experiments remain optimistic PMB 82

Peru Earthquake Prediction Update

Brian Brady of the U.S. Bureau of Mines has altered his prediction that three major earthquakes will rock Lima, Peru, this summer (Eos. March 31). He had predicted that a magnitude 7.5-8.0 event would occur on or about June 28, followed by a magnitude 9.2 event (Kanamori scale) on or about August 10, and a magnitude 9.9 event on or about September 16. No such earthquake occurred in June.

Without the occurrence of the first quake, the other two 'are very improbable,' Brady told Eos. He communicated the update in a personal letter to Alberto Glesecke, the retired head of the Peruvian Geophysical Institute. Brady said he has not made a substitute specific prediction. In January, the National Earthquake Prediction Evaluation Council rejected Brady's prediction, saying they were unconvinced of the scientific validity of the forecast.—BTR &

Senate Confirms Keyworth

The Senate confirmed George Keyworth on July 24 as the director of the Office of Science and Technology Policy. Keyworth, former leader of the physics division at the Los Alamos Scientific Laboratory, was recommended to the Senate following a hearing with the Commerce, Science. and Transportation Committee on July 20. The hearing was organized by the Subcommittee on Science, Technology, and Space, chaired by Senator Harrison (Jack) Schmill (

The confirmation follows by 2 months President Reagans announcement of his Intention to nominate Keyworth.—BTR

Gold Assures Methane

There is enough untapped hydrocarbon juel to last Early thousands of years says quasar astronomer Thomas Gold of Cornell University. He theorizes that these deposits of abiogenic methane are the results of the breakdown of hydrocarbons (trapped in the earth as it formed from solar nebula) under the high temperature and pressure that exists in the earth's interior. The carbon is thereby released the form of methane gas (CH₄), which leaks to the surface continuously, through cracks and fissures in the crust. Gold's methane is not to be confused with the biogenic variety that has been discovered so far (i.e., 'natural gas')-

The arguments for the hydrocarbons being in the earth's crust are based, in part, on the abundance of carbon hy drogen compounds in space. Gold and his associate J. Soler, also of Cornell, have explained on numerous occasions how the hydrocarbon molecules associate in meleciites and, by analogy, in the earth. What has not been explained so far, is where these vast gas deposits are. Gold is arguing that they should be looked for at natural fault and joint systems. He feels that once proven, the deposits can be tapped and used as an energy source of almost II definite proportions.

Recent reports (Chemical & Engineering News, July 18. 1981, p. 17ff.) of a study being done jointly by the Callot nia institute of Technology and the Guif Research and De velopment Co. on monitoring gas emissions along the San Andreas rift zone suggest that Gold's hypothesis may tested. Not much funding for the project has been provide but the study should supply useful data. So far no metial has been recorded along the rift (Gold says the San Alson dreas fault zone is 'too active,' i.e., that methane does accumulate along it, but rather, escapes continuously it levels that may be detectable but probably are not colling to clally viable) but the project is only the beginning of broader effort. Monitoring systems are in the developing and other than the life. stage, and given time, it may be possible to test the lin areas where biogenic methane could not occur. Of such area suggested is the Canadian shield, which sedimentary could be sedimentary. sedimentary gas and petroleum deposits.

Many gas emission studies done in other areas la ported, on occasion, defecting methane. Geochémis mon Craig from the Scripps institution of Obean 90 and has detected methane along the East Pacific Flee locations include a site in Tibet where methane seasts regularly, Yellowstone National Park, and Lake Kivi, Ins. occurrence of methane and other gases slong with the communications of the passes slong with the communications of the passes slong with the communications. There is no evidence where

melhane formed, however, and in no instance, so far, can it be demonstrated that the methane emissions are related to

Methane can form easily by carbon-hydrogen reactions that are other than biogenic. To Gold, however, the ideas are still pretty much untested. He suggests isotope associallons with other gases and geographic patterns that can be used to demonstrate a common mantle source for the methane. The study of gas emissions from fault zones is progressing based mostly on interest in the amount of ³He that is released from the mantle. Gold's enthusiasm has led to the analysis of methane during the other studies. The resulls may support Gold's Ideas, but the fear is that they may not be extensive enough. Some positive results from monitoring over the next year could provide Gold with the basis for obtaining more support.

Gold assures those who question his theory that the gas has to have formed, and he insists that the gas is trapped. Gold maintains these convictions amidst a growing consensus of controversy and doubt by many scientists and petroleum experts. Arguments have been volced during inquirles by the Department of Energy and by the National Academy of Sciences. No one will say Gold is entirely wrong. Howev er, lew believe conditions in the mantle are favorable to rap vast quantities of methane, even given the astronomic theory. Oil companies have found no evidence, even in the deenest wells, but Gold's associate. Soter, says.

because it could be so important if it is correct, '88

Geophysicists

Donald L. Turcotte was appointed chairman of the Denament of Geological Sciences at Cornell University. A member of the Cornell faculty since 1959. Turcotte moved from the mechanical and aerospace engineering department to geological sciences in 1973. He succeeds Jack E. Oliver, Irving Porter Church Professor of Engineering, Ollver is returning to teaching and research after serving as chairman for 10 years. Turcotte is president-elect of AGU's Tectonophysics Section and a member of AGU's Publica-

Gerald J. Wasserburg was awarded the Arthur L. Day Prize by the National Academy of Sciences for his contributions to the physics of the earth. The \$10,000 prize and lectureship is awarded approximately every 3 years. Wasserburg was honored at NAS' 118th annual meeting.

Laurei L. Wilkening, associate professor of planetary sciences at the University of Arizona at Tucson, has been appointed head of the department of planetary sciences and director of the University's Lunar and Planetary Laboratory. She succeeds William B. Hubbard who returned to teaching and research on planetary interiors.

New Publications

A Concise World Atlas of Geology and Mineral Deposits D. R. Derry, John Wiley, New York, 110 pp., 1980, \$61.95.

Reviewed by F. J. Sawkins

This atlas represents an overview of world geology and mineral deposits that can, as the author states, be 'understood by the layman and yet be useful to professional earth scientists.' Derry has produced an informative and well-written volume that essentially succeeds in that goal. It consists of an introductory orientation, an atlas with explanaMaurice Ewing Series: Volume 4

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Deep Orilling Results in the Atlantic Ocean: Continental Margins and Palecenvironment (1979), edited by M. Talwani, W. Hay, and W.B. Ryan, 439 pp., \$18.00 (MEC)300).

Deep Orilling Results in the Atlantic Ocean: Ocean Crust (1979), edited by M. Talwani, C.G. Harrison, and D.E. Hayes, 446 pp., \$18.00 (MEO200).

leland Arcs, Deep Sea Trenches, and Back-Arc Basins (1979), edited by M. Talwani and W.C. Pilman, 480 pp., \$18.00 (MEO100).

tory texts, and finally statistical data on national production and resources of the most important mineral and mineral

The introductory section, which represents a brief review of physical geology, will mainly be of interest to those without any earth science background. It includes sections on landscape and geology, structure and history of the earth, distribution of earthquakes and volcanoes, life, and distribution of mineral resources. It is clearly intended to aid the nonprofessional to comprehend better the explanatory material that follows in the atlas. The final section on distribution of mineral resources would, I feel, have been considerably strengthened by the inclusion of sketches to illustrate the main types of metal deposits and the manner in which these and mineral fuel deposits are created. Such material would have aided all readers unfamiliar with economic ge-

ology.

The second section contains the real substance of the volume and consists of nine map sheets plus extensive explanatory text material. The maps, which cover all the land areas of the earth, are attractively colored and without undue complexity manage to convey a great deal of information on geology and resource distribution. The choice of scales and projections, although not uniform, is intelligent. The distribution of metal deposits is indicated by chemical symbols, but care is required here if the reader is not to gain a distorted impression of the relative importance of different areas in terms of their metal production. However, if the maps are used in close correlation with the text and national production and resource statistics in part three, this

problem can be largely avoided. The most obvious example is the Antarctica map sheet that contains many symbols ndicative of metal deposits that are at best no more than showings

The text that accompanies each map sheet traces the geological development of each (map) area from earliest times to the present. Most major deposits are mentioned. but, here again some unevenness of emphasis creeps in. For example, no mention is made of the important base metal deposits of New Brunswick and Newfoundland. Despite this, and one or two errors in age designations of important deposits, a great deat of accurate and useful information is presented. Unfortunately, no attempt is made to differentiate the mineral deposits by type.

The world mineral production and reserves data conlained in the third part of the volume are important. They serve to emphasize the highly uneven distribution of mineral and mineral fuel wealth amongst the various nations. and, as mentioned earlier, should be used closely with the maps. The linal sections list sources of further information, both suggested readings and the addresses of national surveys around the world. A short glossary concludes the volume.

In conclusion, Derry has produced a valuable synthesis on the geology and mineral resources of the continents. This volume should be of particular use to geophysicists concerned about the resources of our planet.

F. J. Sawkins is with the Department of Geology and Geophysics, University of Minnesota.

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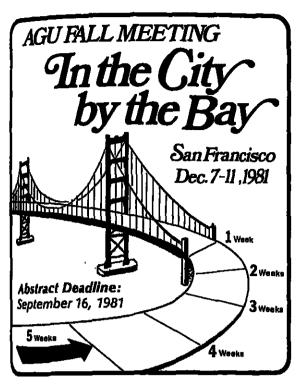
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Meetings



New Listings

The complete Geophysical Year last appeared in the July 21 Buldiace type indicates meetings aponsored or cosponsored by

0d. 28-30 26th Annual Midwest Groundwater Conference, Bismarck, N. Dak. Sponsors, North Dakota State

Jan. 24-29 Conference on Origins of Plasmas and Electric Fields in the Magnetosphere, Yosamile National Park, Calif. Sponsors, NASA, AGU. (F. T. Berkey, Center for Atmospheric and Space Sciences, Utah State University, UMC 34, Logan, UT 84322.)

Feb. 25-26 13th Annual Meeting of the International Erosion Control Association, Salt Lake City, Utah. (M. McMillan, Erosion Control Consultants, P.O. Box 195, Pinole, CA 94564.)

May 3-6 Chapman Conference on the Discontinulties in Rock: Their Role and Significance in Geologic Processes, Sante Fe, N. Mex. (Meetings, AGU, 2000 Florida Avenue, N.W., Washington, DC

May 23-27 Second International Conference on Geological Information, Golden, Colo. Sponsors, Geoscience Information Society, Geological Information Group of the Geological Society of London, International Union of Geological Sciences, Association of Chief Librarians of National Geological Surveys, Association of Geoscientists for International Development. (D.C. Ward, International Conference on Geological Information, 223 Natural History Building, 1301 West Green Street, Urbana, IL

May 24-28 Joint International IEEE/APS Symposium, National Radio Science Meeting, and Nuclear Electromagnetic Pulse Meeting, Albuquerque, N. Mex. Sponsors, IEEE Antennas and Propagation Society, USNC/URSI Commissions, Permanent NEM Committee. (K. F. Casey, The Dikewood Corp., 1813 University Boulevard, N.E., Albuquerque, NM 87102.)

June 21-25 11th International Laser Radar Conference. Madison, Wis. Sponsor, Space Science and Engineering Center of the University of Wisconsin. (J. Edwards, Conference Coordinator, 11th International Laser Radar Conference, Space Science and Engineering Center, 1225 West Dayton Street, Madison, Wi 53706.)

Aug. 16-18 International Conference on Coal-Fired Power Plants and the Aquatic Environment, Copenhagen, Denmark. Sponsors, International Association on Water Pollution Research, the International Union of Pure and Applied Chemistry, Nordic Cooperative Organization for Applied Research. (Dis Congress Service, Linde Alle 48, DK-2720 Copenhagen, Denmark.)

Aug. 25-27 23rd U.S. Symposium on Rock Mechanics. Berkeley, Calif. Sponsors, U.S. National Committee for Rock Mechanics, International Society for Rock Mechanics, University of California, (Organizing Committee, 23rd Rock Mechanics Symposium, c/o Richard E. Goodman, Department of Civil Engineering, 440 Davis Hall, University of California, Berkeley, CA 94720.)

Oct. 4-9 International Symposium on Polders of the World, Agora, Lelystad, The Netherlands. Sponsors, Department of Civil Engineering of the Delft University of Technology, Commission on Hydrological Research of the Netherlanda Organization of Applied Scientific Re-

search, the Usselmeerpolders Development Authority, Society for Waterworks and Land Use Planning. (I. H. Wijkel, Information Centre 'New Land,' Oostvaardersdijk 01-13, 8242 PA Lelystad, the Netherlands.) Oct. 18-21 GSA Annual Meeting, New Orleans, La. (J. M.

Latulippe, Meetings Department, GSA, P.O. Box 9140, Boulder, CO 80301.)

lister Hall, Ilhaca, NY 14853.)

June 13-15 International Symposium on Gas Transfer at Water Surfaces, Ilhaca, N.Y. Sponsors, Cornell University, AGU. (W. H. Brutsaert, School of Civil and Environmental Engineering, Cornell University, Hol-

Oct 31-Nov. 3 GSA Annual Meeting, Indianapolis, Ind. (J. M. Latulippe, Meetings Department, GSA, P.O. Box 9140, Boulder, CO 80301.)

1983

July 21-28 Eighth World Conference on Earthquake Engineering. San Francisco, Calif. Sponsor, Earthquake Engineering Research institute. (R. B. Matthiesen, Chair-8WCEE, EERI, 2620 Telegraph Avenue, Berkeley, CA 94704.)

1981 Midwest Meeting Plan to Attend

September 17–18 Minneapolis, Minnesota

Radisson Hotel (Rates: Single \$34, Double \$40, Triple \$12.50 per person)

Special Sessions:

Thursday • Mantle structure and dynamics Hydrology in the mid-continen-

 Precambrian crustal evolution Friday

of the North American continent Sedimentary paleomagnetism: Geological history from the re-

cent to the Precambrian

 Rock water interactions: Hydrothermal processes and metallo genesis

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Exploration Geophysics

Obid Computer applications MITA-ADATUTE FOR MULTICRANMEL GEOPHYSICAL DATA
J. C. Samson (institute of Earth and Planetary Physics, Department of Physics, University of Alberts, ics, Department of Physics, University of Alberts, Edmonton, Alta., Canada T66 21) J. V. Olson
The design of fath-adaptive (filters requires that the noise is not self-ined, statistically or otherwise, by parameters which allow some means of separating the noise is not from the signal. We consider between which allow some means of separating the noise is less polarized than the signal in a unitary space. This description of the noise is not sofficiant for designing filters which are optism in any annea; consequently, the filters may require a number of changes in the parameters before a entim-factory design can be found. Osce that design has been achieved, the filters can be used to enhance wereforms of arbitrary shaps, requiring little prior knowledge of the appartment of temporal features of the signal. In contrast to many other data-adaptive filters which give a scalar time-acries output, the filters we describe here with the vector time series input have an equal number of input and output channels. A number of examples of filtered magnetic and estant lates are given in order to emphasize the wide range of uses for the filters. Some suggestions for application of the filters to miltichances susseic date are given. Geophysis Coul. 45, no. 10 091G Computer applications DATA-ADAPTIVE POLARIZATION FILTERS FOR MULTICRANNEL

0970 Seismic pathode A BOVEL APPROACH TO SEISMEC BIGGAL PROCESSING AND See 0910 Computer applications See 0910 Computer apprehension of Electrical Engiparry M. Nendel (Department of Electrical Engipaering. Deliversity of Southers California, Los
Augelas. CA 90007) John Kornyllo, Foreydom.
Amingadeh, Ja Burg Lae, and Farrouth Habibi-Ashrafi
This paper demonstrates some results obtained using state-veriable models and techniques to problems
for which solutions either common to or are not easfor which solutions either common to or are not easfor which solutions either common to make-veriable
ily obtained via more conventional input-oniput techniques. After a brief introduction to make-veriable
notions, the foliowing seven problem areas are disnotions, the foliowing seven problem areas are disnotions, the foliowing seven problems areas are discused incommon to a seven and a state of the convergence, simplement of correction for spherical disvergence, simplement variety estimation and decorvolution, well log procussing, design of recursive
memory filters, Recember series decomposition of a
metamogram (including suppression of smithing and
vertical primary profitting), and estimating reflection coefficients and traveltimes,
GEOPRISICS, vol. 46, no., 10

OGIO Salamic methods
HTTMATING ACIDETIC ATTHUATION FROM A QUARTITATIVE
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See 6990 Instruments and techniques
Bobart C. Tyte (Warins, Physical Laboratory, Scripps
Institution of Oceanography, University of Californeeds not sediment by meens of a quantitative action
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mediment. For pelagic sediments, values of about 0.25 dB/m at kEs appear to be common. For the Southern California borderland, a wide range of sediment types is observed, with measured values of affective attemation ranging from 0.21 to 0.01 dB/m. Righly calcaratus (85 percent carbonate) sediments of the Carnegia ridge give quite 1:v values, from 0.1 to 0.2 dB/m, with a suppearion of a rapid darrease in attemuation with dock. For non-biogeous sediments, values of effective attemuation appear useful for predicting other physical properties such as grain size and pornelty, as well as general sediment type, from established inter-calations. relations. Grophysics, vol. 46, no. 10

0930 Seismic methods DIP LINCTATIONS ON MIGRATED SECTIONS AS A FUNCTION DF LINE LENGTH AND RECORDING TIME Description of the control of the co

physics, Stanford University; presently Assect Froduction Co., P. G. Box 3092, Rouston, TI 77001) Fewerd Dategorshi

The length of a maissic profile and the recording time swallable as input to algration govern simple equations relating dip observable on migrated profiles to the spatial location of the reflector. This relationship is smootant to exploration geophysicists seasing critical selenacing mad to despois the season of the continental crust. A certain amount of the observed decrease of dip with depth, and the dip biasing on the edges of migrated sections, can be related to the size of the input, as shown in a real date sexuple. Any further decrease in dip with depth may have geologic significance. To partray (length) may have geologic significance. To partray (length) may have geologic significance. To partray (length) may have geologic significance in partray (length) to be migration as the two-twy migrated time of the target. The lead-in (or neep-in) required on both unds of the line is the depth to the target, for the labeling in the load-in must be recorded and input to the algration; the load-in must be the precent of the algration; the load-in must be by percent of the algration; the load-in must be by percent of the algration; the load-in must be by percent of the algration; the load-in must be prefitted as each which of the profitted and such editors are algrated aneance; (which decreases the disputation of the result of the partition and the migrated an acting (which measures the larget barrison is two-dimensional 12-ph).

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AR EXPERIMINAL TEST OF A LARGE-VOLIDE PLANTIC
PETECES FOR DER 1M AMPILI CAMBA-RAY SPECTMOSCOPY
for 3365 X-rays, gamen rise, and comic rays
Joseph S. David (U.S. Geological Survey, Box 25046,
18 964, Davier Federal Center, Deswer, Gn 80223)
James A. Pitkin
A large-volume plastic detector for use in derical
A large-volume plastic detector for use in derical
planta-ray spectroscopy has been available to the
S.S. Geological Survey. The perpone of the evaluation was to-compare the plantic polysimyl holosoma
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(PVT) detectors in selection and section from the
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compared to the use of SaltTil detectors.

The experimental results indicate that PVT detertion of possibles (E), epitualent station (ed), decentral possibles (E), epitualent station (ed), decentral possibles (E), epitualent station (ed), decentral possibles (E), epitualent station (ed), derelatively, jour-andray resolution of the PVT deterral
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Geochemistry

1810 Literatory of the almosphere CHEWISTER WITHIN NOLEDUS ATMOSPHERIC AERICHOLS AND RAINDROPS TE CARREL (Bell Laborationes, Marray Hall, NJ 87974)

and CJ Weighter.

Bendreds of charmost compounds have been identified as continuents of amospheric actatols and runnfarge, and there is substituted and encountry among them. Since tropospheric aerosols have a water content of 10-30 weight fement at typical relative humidities, associal and runddings may be regarded (at texts to a first approximation) at square one politicals. In this searce, almospheric measurements and solution chemistry data are combined to expose reservoir and runding spatents, much of the information is potentially applicable as well to lake and cream target waters. Among the conclusions are the following.

are the lottering.

(1) Softer reddetion personates actives necrosols and mundrops, photodiscouring several molecules and loss. Highly, formed in the gap phase and disastent in the seronal, photodiscourants to produce OH, which is then a common constituent of action successives explained and appears to play a role in many che succel processes.

(v) The decomposition of almospheric exong descived in exec-on acrosols of randrops of a second profile source of HO, molecula.

(ni) An analysis of the transition metal chemistry appropriate to these systems indicate that copper, marginates, and vasi-them are potentially the roots important homogeneous cooligies and that the concentrations of immunion metals in

(ir) The auditions of allages to electric, of alcohols to alletydes, and of aldelydes to earlystyle acids repair from chemical chains initiated by hydroxyl makesh or perhaps by organic photochic perkty (v) Rain parameters are available for many of the reactions of interest, particularly for the intergraph processes. Tablets

(115 The troposphere across one be present schemeterally as an aqueous persueds surrounding an intellible one and covered by an organic unifore him of verying theory, third new and compounds For, Goophys, Space Phys., Paper 191068

Geomagnetism and Paleomagnetism

2610 Bynamo Theories A SIMPLE PHYSICAL MODEL FOR THE TERRESTALAL OTHER DISON (Earth & Planetary Sciences Dept., The Johns Hopking Univ., Bellimore, NO 21218

Dest. The Johns Hopkins Univ., Beltimore, NO 21218
The attempth of the earth's magnetic field results from an equilibration between rates of beyond ender production and Offsic dissipation. Changes in segments field, in particular the long term changes in dipole moment, provide as indication of changes in core energy sources, and so become critical data for understanding the evolution of both the core and deep sentle. A simple physical model is proposed to establish a connection between dipole moment behavior and production of accordancy within the core. The model rests on two hypothesis: (1) sequelies is generated by smill scale, relation dominated turbulench tonsisting of 4 fined of propagating inertial waves, and (2) the turbulence is supported by a fine of buoyacty, thereal or congositional, originally either at the core-mainte or leber core boundary. The efficiency with which wave inertial electroning by the particular or segments wave fined by the nave helicity - the corrulation between valority and vorticity. The wave helicity and vorticity. The wave helicity and vorticity.

* Sales . Ex 3



city is non-zero if there exists a preferred propagation direction. Require buoyancy tenerated at the santle-care toundary leads to propagation radially ismard; positive budyancy gragation radially ismard; positive budyancy gragated at the inner core bundary leads to radially dutuard propagation. Union parameters appropriate for the earth's core, we find that the interclais wave dynamo dissignates 8 x Inii W in gonerating a ragastic field equal to the present terrestrial field Four energy sources are considered; decay of polossium 40, secular cooling, inner core growth, and differentiation of the rare from the mintle. Any of these sources can reasonably support the turbulent dynamo for come of the earth's history. (Majonatic Field, Earth's Core, inertial Waves). Geophys. Pos., Red, Paper 18100)

Hydrology

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Meteorology

3710 Noundary layer structure and proceases
REMULATION OF THE EFFECTS OF SURFACE
PLUKES OF MEAT AND ROISTURE IN A MESOSCALF NUMERICAL MODEL, PART II SOIL LAYER
M.C.McCusber (Nopt. of Environmental
Sciences, Clark Hall, University of Virginia, Charlottesville, Virginia 27903)
and P.A. Fielke.

A parameterization for bare soil is
downloped, which is to be incorporated
in a mendecale numerical prediction
roial. This parameterization is generalized to accomment aleven types of soil
in addition to peat, using mean soil
characteristics.

The sonstituty of the scheme to
several soil parameters is evaluated by
a decide of une-diransional simulations.
It is shown that the most important soil
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characteristic is the soil mental soil
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fluces between the atmosphere and the 1710 Nousdary layer structure and pro-

-{round. J. Geophys. Les, Green, Reper 10112)

3713 Chemical composition and chemical interactions
MPACUPHENE OF HEAVY OZONE IN THE STRATOSPHERE
F. Homerberger Isclave of Physics and Astronomy,
Environisty of Himmedia, Kinneapolis, MS 33435)
The distribution of heavy ozone (solecular mans
30) has been measured for the first time in the
stratosphere wich a meas spectrometer system.
Darling a balloon deacent after addight on Sept.
**, 1980, a pronounced enhancement of heavy ozone
was found. The maximum in the Lastopic ratio,
180(6), a pronounced at 32 he where the enhancement of heavy ozone was over 40%. The ratio decreased toward higher and lower attitudes, and
reached the standard value below 24 he. These
measurements confirm in cartier prediction that
there exists a preferred production machanism
for heavy ozone in the stratosphere.
deephys. Les. Latt., Paper 11.1079 3715 Chamical composition and chamical inter-

1715 Chamical composition and chemical interactions MEASUPEMENTS OF CO AND CAL IN THE TROPOSPHERS OVER LAND! ARBITAL SURVEY MEMORIAN SEA SURIES THE 1979 INTERRATIONAL SURVEY MEMORIAN EXPERIMENT

ANDER ARRELA, IMDIA AND THE ARADIAN EAR SURING THE 1379 INTERRATIONAL SURVEY MANSOON EXPENSION EXPENSION (NEMER). P.P. Newell (Dept. of Meteorology and Physical Cleanurysphy, MIT, 54-137), Camirsion, MA 02139), E.P. Lowing the 1879 Summer MCDEX 150 air surplus collected over Baudi Arabia, India onl the Arabian Sea were Analysed for DO onl CH4. Best Daharan and over the Ganges Valley there were high concentrations of CO, accord 100 plus, in the loundary layer. Out over the Saudi Arabian desort thore was no sharp increase in the boundary layer. Out over the Saudi Arabian desort thore was no sharp increase in the boundary layer. Out over the Saudi Arabian desort thore as in sharp increase in the boundary layer. City down to 80 plus, are found over the Arabian Sea as the remander progresses and those may originate from the Southern Memisjance. Methane over Saudi Arabia (1.59 ppm) is a little higher than that over the Arabian Sea (1.54 ppm) probably because the latter region is influenced by air firm the Southern Remisjance. (Calpoin Mondalf, Rethano, Bonnoon, North, J. Grophys. Ras., Grem, Paper (C1094)

1720 Climatology NUMERICAL SIMULATION OF THE ANNUAL CYCLE OF CLIMATE DURING THE ICE AGES J. Aden ICentro de Ciencias de la Atrôsfera, Universidad Macional Autónoma de México, México 20, D.P.)

México, México 20, D.P.)

Valng a hemispheric thermodynamic grid

model the annual cycle of climato for

18,000 years ago is simulated. It is

shown that the difference between the shown that the difference between the position of the anow-ice boundary of 16,000 years ago and the one of today was much largor in Summer than in Winter and that the annual cycle of the snow-ice boundary for today has more variability than that for 18,000 years ago, Duo to the temporature anow-ice feedback, the sonally averaged surface and mean at Fompheric temperature enomalies (with rethe consily averaged surface and mean at respheric temperature anomalies (with re aport to today's normals) are negative and their absolute value is much larger in Surver than for the other seasons of the year, and increase from lower to the year, and increase from lower to higher letitudes. Comparison of the con puted surface temperature values with the values estimated by CLIMAP shows gen the values estimated by CLIMAY shows general good agreement. The computed awarage surface temperature should for the Northern Hamisphers for July is equal to -4.7°C, in good agreement with the value -6.9°C obtained by CLIMAP. (Annual cycle, tce ages, sirulation, climate). J. Geophys. Res., Green, Paper IC1174

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3723 Ciunatology
A QUARTITATIVE APPROACE TO LONG-RANCE PREDICTION
B.A. Hat iden [National Center for Almospheric Research, P.O. Res 3000, 20.1der, CO 53192]
Commiderations are presented which allow for a more quantitative appressed to the problem of long-range prediction. It is supposed that the interacoust waterance of time-averaged metoorological data is composed of approximately separable component. One component united "climate noise" railacts ampling warishing of finite time-rantacts ampling warishing of finite time-rantacts in 100 lead times. The remaining variance is assumed to be potentially predictable. Circumte outs and potential predictability of winterman Lamperature for united States erations. It is further supposed for a component that we cannot approximate for United States erations. It is further supposed of a component that we cannot approximate that we cannot approximate that we cannot approximate the petentially predictable part is composed of a component that we cannot approximate the inhead through laguerrals loss us succiated with the Synthem Osciliation. The lapact of the continuation of citizenses. The teach of improving the variance, or "effective manage for on the unfulners of this signal is discussed. The teach of improving the visit of long-range forecasts to described as one of transferrange forecasts.

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too low. A very small namer of flastes, produced
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were seen passing through the back of the radar.
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were seen passing through the back of the radar.
These others behaved in although many flashes
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come materials echoes statiate to those on observaed at VM years seen at 5.5 cm also and as supposed
that they were reviseded by channel-legipous that

happened to be overdoned at 5.5 GHz. The 50 cm and the 111 cm radars produced already whose from every flash that we saw passing through the beams of the radars. Echoes were perfectly first strong on the radar with the located pulse. Echoes received not a dark that transantical pulses 700 name econds from consisted of short conjuments. Some flash in reflected only one content of small characteristics and consistency of the flash in reflected only one content in the state flash of the core many areas and a saw at the same area. Social factor in terrection only one or present futures and prior tere may some and a compact at thirty expanse concernents have been counted. This paper supplies data relating to the ream values and to the dispersion of recht energy sectional means of lightning channels viewed by the solid. VIII vader. J. Geophys. Res., Green, Paper 101108

Oceanography

4740 Harine geological processes
SEDIMENTARY PROCESSES IN THE GREAT LAKES
David K. Ras (Gesanography Program, Dapt of
Atmospheric and Gesaic Science, The University of
Atmospheric and Francisco Science and Thillip A. Mayers
Sediments in the Orest Lakes are subject to four
general rategories of processest topul, transport,
deposition and post-depositional alteration. Sedimentary input is from cosatal resulen (542), riverint laput (265), atmospheric transport (3X), and
saveral leaser source (7Z). Once in the lake,
sediments are transported to their place of deposition along the bottom and/or in suppassion depending upon grain size and density. The cate of deposition to the Great Lakes is variable and ranges
from outhing in some areas to over 6000 gin/fy in
the sestern basin of lake Erie. After deposition
sediments undergo historion, dissolution of
carbonars and opal, resubilization of many metals
followed by repracipitation within the surficial
oxidized layer, and degradation of organic compounds.

Rev. Geonber. Space Three. Name Indice.

May. Geophys. Spacs Phys., Paper 181109

4740 Marine geological procusses
MARINE GEOLOGY OF THE MESS SIZE PART I:
ALTHVERITY, SURFACE SECTIONS TO SET ISOTION, AND
ENVIRONMENT OF DEPOSITION

1. Francio (Marwall Institute of Geophysics,
University of Hawaii, 2525 Correa Road,
Sonololu, HI \$6822) and L. W. Krosche
Env Cherts of habethys. les, a large occanic plateau in the central orth Pacific. Five discrete types of acoust units here been identified on the basis of acoustic units here been identified on the basis of 3.3-Ms echo cheracter across the Rise and Interpreted. Available core data and RNP data confirmed the presence of a characteristic litholary for such of the acoustic units. The pronounced effect of bottom currents on the

present-day anvironment of deposition in the Hasa Rise is evidenced by the presence of an accional surface, current meating and abrupt thioning of surface layers and truncation of subbotton reflectore. The widespread erosion of the abyasal floor of the Handocino Fracture Zone is attributed to the flow of Antarctic Settem Water. This study has shown that 1.5-kHz scho character is a useful and sensitive indicator of the lithology and environment of deposicion. (Sathymetry, echo character, bottom current, aubmarine erosion).

J. Geophys. Res., Red. Paper 181052

4765 Surface waves, tides, and see level EFFECTS OF ISLANDS ON EQUATORIAL WAVES J. B. Youn (Geophysical Fluid Dynamics Program, Princeton University, Princeton, N.J. 083401
The effects of islands on equatorially trapped waves induced by the sudden onset of zonal wind are investigated by solving the shallow water equations numerically.

The energy propagation sasociated with an equatorial Ralvin wave is almost unseffected by an island on the equator. The energy transmission ratio is over 0.8 even when the north-south extent of the island is the ames as the Rossby deformation radius. It is also shown that the Maidive Islands in the Pacific Ocean do not affect the energy flux associated with Kolvin waves significantly. The soa level mark the island, however, differs significantly from the see level associated with an equatorial Relvin wave in the obsence of an island. This result has important implications for the interpretation of see level massurements at equatorial islands. On the other hand, the energy propagation of equatorial Rossby waves (the lowest mode in the north-south direction) is greatly affacted by an Island on the equator. The energy transmission ratio is less than 0.3 when the north-south extent of the leind is the same on the radius of deformation. (Effect of island, equatorial wave, ace level, energy transmission).

4770 Turbulence end diffueion VERTICAL TURBULENCE DIFFUSIVITY POR VEAK OR STRONG STABLE STRATIFICATION WEAK OR STRONG STABLE STRATIFICATION

J. Neinstock (National Oceanic and Atmospheric Administration, Aeronomy Laboratory, Boulder, Colorado 80303)

A theoretical relation is derived for the vertical turbulent diffusivity Ker in weak as well as atrong stable stratification. This relation expresses Ker in terms of the buoyancy frequency (Stunt-Valuella Fraquency), the energy dissipation rate c, and the characteristic energy containing wavenumber by. A previous relation was limited to strong stable stratification.

J. Geophys. Res., Grean, Paper 101093

Geomagnetism and Aeronomy Volume 20. Number 4

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Dorman L. I., Shogenov V. Kh. Kinetic theory of modulation of galactic cosmic

Dorman L. I., Shogenov V. Kh. Kinetic theory of modulation of galactic cosmic rays by an interplanet magnotic piston

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outer ionosphere at middle latitudes
Izhovkina N. I. About relaxation of anizotropic monoenergetic electron stream
in the ionosphere in the ionosphere Gusev V. D., Ovchinníkova N. P. Model definition of volume characteristics of

Gusev V. D., Oveninikova N. P. Model definition of volume characteristics ionospheric tregularities.

Gusev V. D., Vinogradova M. B. Influence of large-scaled irregularities of the ionosphere on the field structure of a reflected wavo.

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near a mezopause
Gavrilov N. M., Pogorelizev A. I. About influence of gravitation waves on exygen composition of the lower thermosphere
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Krylev A. L., Livshiiz A. E., Federov E. N. About resonance proporties of force

lines of the magnetosphere

Zhmur V. V. About variations of electromagnetic fields, induced by oceanic movements of a synoptical scale
Semency V. Yu., Fonarev G. A., Volkomirskaya L. B. Electromagnetic field of distributions of the constraint sturbance at a three-layer geoelectrical cutting

Leibo A. B. An one propable model for impedance estimation in horizontally honogeneous medii
Paplitashvili N. E., Rotanova N. M., Pushkov A. N. 60-year variation of the geomagnetic field on the territory of Europe
Zhdanov M. S., Rotanova N. M., Chornova T. A. About analytical continuation of the main geomagnetic field and its secular variations
of the geomagnetic field

of the geomegactic field

Kravekenko V. B., Khromov A. A. Optimization of the route procession of the

Brick information

Besprizvannoya A. S., Makarova L. N. Influence of parameters of IMF on ionization Sergeenko N. P. Ahout variation of horizontal gradients of pressure at ionospheric being to the polar cap.

Sergeenko N. P. Ahout variation of horizontal gradients of pressure at ionospheric heights during geomagnetic disturbances.

Deminov G. F., Yudovilch L. A. Planetary development of the ionospheric substorm of Sentember 18, 1974. Deminov G. F., Yudovitch L. A. Planetary development of the ionospheric substorm of September 18, 1974

Lois L., Shashunkina V. M., Yudovitch L. A. Effects of inner gravitation waves in the period of the magnetospheric substorm of February 15, 1978

during positive ionospheric disturbances

Kulesheva V. P., Lavrova E. V., Lyakhova L. N. Forecasting of development of Teretshenko V. D. Definition of parameters of the ionosphere by the method of a pleama line a plasma line

A plasma line

Tokar V. G., Nadezhnikov Yu. I., Nikitin M. A. Calculation of parameters SW

Tokar Y. G., Nadeshnikov Yu. I., Nikitin M. A. Calculation of parameters 755 addesignals with using table models of the ionosphere (lifusion of artificial luminiscent clouds Shagaev M. V. Alont vertical gradients of temperature and dissipation of inner pravilation waves here a more processes. Shagaov M. V. Alont vertical gradients of temperature and dissipation of inner gravitation waves near a mozopause in the ragion of a mezopause in the ragion of a mezopause of the ragion of a mezopause of the ragion of a mezopause of the ragion of charged particle streams at night hy intensity of atomic of the ragion of the ragion of charged particle streams at night hy intensity of atomic of the ragion of a mezopause of the ragion of the ragion of a mezopause of the ragion of the ragion

Particles and Fields-**Interplanetary Space**

100 Comic Pays
V.NC-RM SCHPTILLATIONS OBSERVED FROM SPACE
A. J. Omes (Bartol Petearch Foundation of The
Numblin institute, University of Deleware,
Numblin Deleware 1971)
A sheatclesi calculation is given for the
Contiliations of fluctuations of commic rays a measured calculation is given for the "minitilation" or fluctuations of commic rays mycase to a observed during quiet times by a factor in interplanetary space or on the lunariation in the interplanetary and intilations caused in lateral complaints of the lunariation in the interplanetary magnetic field are not sufficient to explain the power space, there accountly reported by Bonson et al. (1911 from a debottor on the moon. Their giarred cosmic-ray fluctuations are considerably larger than observed during undisturbed parties by ground-based and satellite experirestê. Sephys. Res. Lett., Paper ML1081

sylva. Fig. 1. Carrier of the New Entroy Bucleon ylux isociation with Ciril S. T. Christon (Varico Farmi Institute and September of Physics, the University of Chicago, Chitago, Illimois)

Bentyrements of recurrent enhancements of Interplanetary nucleon flux is the May energy site, distated at widely separated points in the Malesphere by wharged particle instruments on best the Figure 10 and 11, IMP 7 and S and Burier 10 spacetraft, are presented and interpreted. These features recur at the solar retailor period in seacciation with stream-stream plane interaction regions servating with the refull and are not directly produced by solar floring setfwiry. At distances from the sum of 12, IMP and the season (IMB) and are not directly produced by solar floring setfwiry. At distances from the sum of 12, IMP, and the season strength in these flux phinases and the physics of the hydrogen (E) and helium (Me) components in these flux phinases increase with increasing rate these zite, meaning the differential managa pretty are telestively constant with r. One of the models proposed to explain these enhanced fluxes profitts the acceleration of nuclei from kay plane complete to KeY energies via the transit the duping of segmentosonic waves as solar wind plane flows from the sum. The predicted neutration rates of H and He are different in this sodel. We compute numerical solutions of the transport equation to show that this model issue of reproduce the radial variations of the H set is fluxes observed with manily identical intenset. Flux associated with one of the relative rare CH shocks at 1 AU is shown to be sumilar to the flux in other corotating substreament. Direct estimates of the radial variations of the flux in other corotating substreament. Direct estimates of the radial variations for the relative variation at the CH at the substant with two derived in studies of solar flare related publicle flux and other corotating nucleon flux statements at higher rigidities. The chargetic particles, acceleration, CHes).

1. Supp

in Comic rays

NOT OF TRI-DURNAL VARIATION OF

ALCING COSMIC RADKATION

1. i.i.graval (Margbarg Institute of
intopyaics, NRC, 100 Sussex Dr.,

Olives, Canada, KiA ORG)

Using the experimental data of the
intoming rate neutron and meson
salors, the solar tri-durnal enisubory of galactic cosmic radiation
tyless investigated for the period
folicy. The enhancement of the average
indurnal smplitude observed by all
the datectors during 1973-79 provides
sificient signal to noise ratio to
then its variational characteristics.
he charactery anisotropy having a
pass law rigidity spactrum emponent

2. The tri-durnal smplitude varies
as cost, where h is the effective
instantial average tri-durnal smplithe shows a significant positive
trilation with the semi-durnal
splinds for the period 1958-79. The
strilation with the semi-durnal
splinds for the period 1958-79. The
strilation however, is poor for the
said spead shows greater amplited to the presence of significant
keinstein spead shows greater amplitude of both the tri- and semi-durnal
ways for the group of days with high
ways of the presence of a factor of two
larges in both amplitudes during
179-79, a parlod when high speed
12-1- indicates in both smplitudes during
179-79, a parlod when high speed
12-1- indicates in the scal-durnal
ways for the group of days with high
wind streams were prevalent,
115 sephys. Res., plus, Paper 140641 ωρλγα. Xee., Άμνα, Paper 1Α0641

I, imphys. Rem., Blue, Paper LA106B

INCOMIC TOYS

TARGETON OF LOW EMERGY SOLAR ELECTRONS

1. i. Medison (Space Sciences Laboratory, Unimity of California, Berkeley, California
1020), J. P. McFadden, and R. P. Lin
Hettons of solar origin in the sery range
1 to 20 kay frequently appear near Earth in imPle supular distributions of these particles vary
104 105 for the several hours duration;
105 any frequently appear near Earth in imPle supular distributions of these particles vary
104 105 for one event to the next. We discuss
104 such sents. In one of these, the pitch
105 size are strongly packed in the forward direc106, showing that they have propagated under
107 size in the strong the server of directed on the conditions over distances or conjugated that they have propagated under carry adiabatic conditions over distances on the effer of an astronomical unit. During this event the interplanetary medium was characterized by a locatesaity of anguetic fluctuations. At other ites the electron events have broad pitch angle iteletions. At such times, etractures are freeze in the interplanetary magnetic field which they arrived the interplanetary magnetic field which they arrived the interplanetary magnetic field. The bit time interplanetary magnetic field. The litt angle distributions also possess factures that can be understood as adiabatic antroving stream fields etronger then those sear Earth powered they which, typically, have double the quiet time fair distributions can be understood as a superfect of selection of adiabatic mirroring and pitch angle distributions can be understood as a superfect of selection in the convecting interplanetary structuring is the convecting interplanetary magnetic field structures. (Solar electrons, interplanetary madites, particle propagation).

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Type, Rus. Lett., Fapar 11,0816

Jile Camia Rays

THE DIVISIAL AMISOTROPY OF COSMIC

IN PRESENT DURING THE DIVISIAL AMISOTROPY OF COSMIC

IN PRESENT DURING THE DIVISIAL 1973-1978

I.E. AFRICAL and D. Vernicasain (Department of

Byles, the division of Calgary, Calgary,

His study utilizes the neutron monitor data

Inc lis four Canadian stations of Calgary,

hee liver, Goods Bay and Inquist; The period

of study comments that Ingeneral, the

Indian provides the Interval 1971-1978. The

Indian provides that in demeral, the

Indian provides in the distribution of the

Indian provides on the distribution of the

Capacant, which has very little 'power'

trop is and too different from the disconting

Interpretation of the grands anison

trop is at too different from the disconting

perpendicular to the Her. The chearyd casually

are discussed, in terms of alternate possibili-ties. The 'power' with 27-day period and its harmonics arise from fluctuations in the amplitude aligned in the direction (a) of the total wester itself ('Mi6 hours) (b) perpendi-

J. Geophys. Res., Blue, Paper 1A1040

5360 Solar wind Interaction with moon and planets A SOURCE OF PLASMA TURBULENCE AT THE 10H0PAUSE OF THE DESIGN THE MALE AT THE TONOPHINE OF THE TONOPHINE OF PLANTA TURBULENCE AT THE TONOPHINE OF THE A SOURCE OF PLANTA TURBULENCE AT THE TONOPHINE OF THE ASSOCIATION OF THE ASSOCIATION

the planet. J. Geophys. Res., Bluu, Paper IALLIS

5380 Solar wind plasma
INTERPLANETARY ALFVENIC PLUCTUATIONS:
A STOCKARTIC MODEL
A. Barras (Asse Research Conter, MASA, Moffett
Field, Celifornia 94035) ield, Celifornia 94035)
The strong alignment of the average direction of minimum magnetic variance and mean mag-patic field in interplanetary Alfvanic fluctustions is inconsistent with the usual wave propagation models. We investigate the concept of minimum variance for nonplaner Alfvenic fluctuations in which the field direction veries scoolmentically. It is found that the tendancy of the minimum variance and mean field directions to be sligned may be purely a consequence of the randomness of the field direction. In particular, a vell-defined direction of minimum variance does not imply that the fluctuations are necessarily planer. The fluctuation power superior is a nover lay The fluctuation power spectrum is a power law for frequencies such higher than the inverse of the correlation time. The probability distribution of directions for a randomly fluctuating field of constant capitude is calculated. A new approach for observational atudies of interplanetary fluctuations is

5180 Solar wind plasma PRONQUINCED PROTON CORE TEMPERATURE ANISOTROPY, ION DIFFERENTIAL SPEED, AND SIMULTANEOUS ALFYEN MAYE ACTIVITY IN SLOW SOLAR WIND AT 0.3 AU NAME ACTIVITY IN SLOW SOLAR WHID AT 0.3 AU

[. Harsch (Max-Planch-Institut für Aaronomie,
1411 Katlanburg-Lindau 3, Federal Republic of
Germany) K.H. Muhlhhuser, H. Rosenbauer,
R. Schwenn and K.U. Densset

In the Meliou-2 perthelion (0.3 AU) in May
1978 promounced ion differential speeds &v., o
and large proton temperature enisotropies
Tap / Tap c. have been observed in slow solar
which in distinct contrast to earlier observations during the phase of solar activity minimus. These features of ion distributions
occurred simultaneously with high Alfybnic wave
activity. Couloeb friction between the two ion
species can be shown to play a minor role, thus
obviously favouring the establishment of a large
differential ion speed by preferentially accelerating wave forces. The observations may also
indicate that strong waves sometimes only heat
the protons but do not create a fast solar wind.
J. Geophys. Rea., Blue, Paper LA1003

Particles and Fieldslonosphere

5510 High-latitude ionospheric currents
FOST SUBSTORM CONVECTION AND AUBORAL ARC
CURRENTS DETERMINED FROM MULTIPLE IONOSPHERIC,
MAGNETIC AND LIECTRIC FIELD OBSERVATIONS
John K. Walker (Earth Physics Branch, Department
of Energy, Mines and Pesources, Ottawa, Canada,
KIA 071), Ja. Koehlor, F. Creutberg,
A.G. McRauta, A. Vallence Jones and B.A. Whalen
Field, particle and optical observations from
rocket-borne probes, magnetic data from smartiien chain of stations and data from 3 acandag
photometers were used for analyses of suroval
current system during the recovery phase of a
substorm. The rockets were launched southmastward over saveral discrete area from fr.
Churchill, Canada on January 15, 1972. Current
models were determined independently from the
segment of field observations and from the electric
fields were measured by a rocket-borne electric
fields were measured by a rocket-borne electric
field and ionospheric observations. The electric
fields were measured by a rocket-borne electric
field was measured by a rocket-borne electric
fields were measured by a rocket-borne electric
field was measured by a rocket-borne electric
field was measured by a rocket-borne electric
field some measured by a rocket-borne electric
field was measured by a rocket-borne electrostatic mealyses within the ionospheric model was
determined from the anargetic particle
observations. Broad westward current systems
were encountered on the initial and final engment of the trajectory and ware datarmined from
Ohn's law and compared with those calculated
from magnetic observations do a model
ionosphere and were seasured. From the spokes
segment of the trajectory were calculated from
the maridien current and added to these electroitem of the trajectory were calculated from
the maridien current and added to these electroitem of the trajectory were calculated from
the maridien current and added to these electroitem of the trajectory were calculated from
the maridien current and added to these electroitem of the trajectory wer reasonable it to the control of the

5935 Interactions between seves and particles
STABLLIZATION OF ELECTROSTATIC, PURELY ENGNING,
FIRITE ION-STORAGIUS, FLUTE INSTABLLIZES IN
THE ION-STORAGIUS, FLUTE INSTABLLIZES IN
THE ION-STORAGIUS, FLUTE INSTABLLIZES IN
THE ambient background plasme is shown to have
an important stabilizing influence on the generation of electrostatic, prely growing, finite
for-gyrondies, flute instabilities driven by
ion loss come distribution functions associated
with shoped barlum injection across the ambient
with shoped barlum injection across the ambient
with shoped barlum injection across the ambient
paginetic field in the ionosphere. This stabilization laplies that such short acale size lastazation laplies that such short acale size lastazation laplies that such short acale size lastathities and the striations they produce, will
noily be present if the background plasme density
is los enough, consistent with the experimentato-severiment the background plasme density inexperiment the background plasme density insufficient to completely stabilize the finite
ion-cyperadium docks; honever, background ion
ion-cyperadium docks; honever, background ion
level predicted, with a theory which does not
include the background plasma dynamics.
J. Geophys. Bass. Sine, Pager 14,1690.
J. Geophys. Bass. Sine, Pager 14,1690.

5343 lansepheric disturbances
PRODUCTION AND DYNAMICS OF HIGH LATTIUPE
IRREGULARITIES DURING MACRITIC STORMS
Z. Houminer (Air Force Geophysics Laboratory,
Hanston AFR. RA 01731) J. Aerona and F. Fich
Schutilias ion phage tarion observations at Vist and List fre-1971-72 and 31-2 in 1973-75 show two areas of irregularities during magnetic storms. The two regions are related to the plasmplane and to the auroral owal and straddle the minimum electron density region of the trough. The plasmplanes irregularities are located on the equatorwards edge of the trough and any oatond several degreen in latitude. The electron density trough facelf shows very low activity of irregularities, while the polaward wall of the trough in the brightning of the region where auroral owal F layer irregularities are present.

Using C1-2 observations of electron and ion density, electron temperature, magnetic field and precipitating particles, it is suggested that the production sechanics of the plasmplane irregularities in the temperature gradient drift instability. It is also shown the surroral irregularities in the temperature gradient drift instability. It is also shown the surroral irregularities in the temperature gradient drift instability. It is also shown the surroral irregularities in the temperature gradient drift instability. It is also shown the surroral irregularities in the temperature, gradient drift instability. It is also shown the surroral irregularities in the temperature, since Illa-

tions). J. Geophya. Res., Blue, Papar lAille

5560 Particle precipitation HADDETIC FIELD ALIGNED ELECTRON DISTRIBUTIONS IN

THE DAYSIDE CHEP
L. J. Zenetti, T. A. Petenra (Applied Physics
Laboratory, The Johns Bepline University, Laurel,
Maryland, 20210), J. F. Deering, J. S. Lea and
R. A. Hoftman
Chaervations of low-energy electron fixuse made
over a six year paried with the photoslactron
spectrometer (PCS) onboard the AE-C and AE-O
spectrometer (PCS) onboard the AE-C and AE-O over a sh year period with the photoslactron spectrometer (PES) omboard the AE-C and AE-O spacecraft have been used to complie the first detailed survey of electron pitch angles in the low sittude cusp. One 16 point energy spectrum from 2 to 300 eV was obtained every 1/4 asc with the PES instrument (with energy resolution AE/E = 3.5%) providing a pitch angle resolution of about 6° at the 4 yes speceraft spin rate. The location of the cusp was verified by the presence of protons detected with the low energy electron (LEF) instrument. Observations care generally acquired below a 300 km sittude with a few case near 1000 km sittude. Instruments of a few case near 1000 km sittude. Instruments of a few case near 1000 km sittude. Teatropic fluxes of precipitating electrons with Maxwellian energy spectra and characteristic energies of a few tens of eV were observed in the 10W altitude cusp as expected. However, the outstanding result that has emerged from this study is the presence of low energy electrons with pitch angles less than 15° streaming dom into the tusp ionosphere. The energies of these streaming electrons scretimes appear as a peak superimposed upon the "normal" cusp Naxwellien background of lactropic electrons. The streaming electrons of luxes appear in about half the cusp observations, so we believe them to be stable features (i.e., they are not short burste of particles). Using the welcety described and not only completed from these FES cuspuroments, we conclude that the streaming electrons cannot be explained in terms of a cusp planus falling through an electric potential above the Al spacecraft.

J. Geophys. Fes., Slue, Paper 140315 J. Geophys. Rev., Blue, Paper 140)15

Sydn Make Propagation
Sydn Characteristics of Sphero F at the
MANACTERISTICS of Sphero F at the
Manacterist of Propagation of Sphero
Conselho Salamand de Communication of Intelligence
of Intelligence of NPG, 12700 - San José dos
Campas, San Faulo, Breatly.
Sphero f to recognize to both the range and
fraquents against these are studied for the
Campatic equatorisal station Fortaleta (Georgi,
ASM, 255) dap lat. -1.79 for a one semp period
during 1978-79. Sancellite traces suscenting
confustion of the orthodometric of the Control
English Sphero F at the Control
English Sphero F at the Sphero
Fortaleta as compared to Manacter different care mater
Fortaleta as compared to Manacter Geographics
75,804, 11,955; dip lat. 0.604, situated within
only -190 an longitude west of Fortaleta. The
post sunset maximum in NP, in wanter, is dalawed
by about i 1 h with respect to other seasons
over Fortaleta, as corpared to Manacter, where it
occurs earlier in winter than in other seasons.
Similar differences exist also in the preferences. peak near number in the vertical drift velocity ty, between Fortaleza and licatures. The differences are attributed possibly to the largu-difference in the Lightite field declination and to other factors such as the difference in the Cagnatic field intensity and the rolative separation between geographic and cagnatic squators that exist between fortulate and the other stations. J. Geophys. Res., Blue, Paper 149-69

5599 Ferticles and fields - Londsphers About the Parametric interfat retwice fould MACH Number, Boot-512E AND Reveller Potential IN Determine the low depletion is the ware of the DETERMINE THE 10R DFFLETION IN THE MAKE OF IN-53-2 SATSLITE U. Samir (Space Physics Research Lab. Univ. of Richigan, Ann Arbor); F.J. Wildman, F. Rich, R.C. Briston and R.C. Segalyn Heasurements of ion surprast, I, electron tem-perature and density and values of satellites potential from the U.S.A.F. satellite 37-2 to-subhay wife ion composition measurements from potential from the U.S.A.F. satellite 37-2 togather with ion composition measurements from
the Atmosphere Explorare? Satellite were used in
order to examine quantizatively the vertaction of
the ratio of - Licularitical the vertaction of
the ratio of - Licularitical the vertaction of
the ratio of - Licularitical the vertaction of
the number, normalized body size (- body size)
ablent bebys length) and normalized body potential (- body potential in terms of slactron
thermal energy). It was possible to separate
between the influence of oursalized body size and
normalized satellite potential on on in the potential range of -17 to -10, and for 10-3 c. s 10-1.
These ranges cover almost the antice range of
planetary ionospheres. It was found that the
parametric interplay between normalized body size
and average ionic Mach number (creaonly used) is
less physically meaningful than the latercomparison between normalized body size and
the for the interplay detween the constituent comparison between normalized body airs and the tonic Mail numbers due to wark tonic constituent

Particles and Fields-Magnetosphere

meparately. I. Geophym. Mes., Blue, Paper 140837

5720 Interest ions between sules wind and magnetosphere
SOLAR WHO CONTROL OF AUBORAL 20ME
GEOMATIC ACTIVITY
C.R. Clauer, (institute for Flaska Besoarch,
Stanford University, Stanfourd, California 94 105)
R.L. Achterton, C. Searle, M.G. Elvelmon
(Inactives of Geophysics & Flanciasy Physics,
Oniversity of California, Los Angeles, California, 90 Angeles, California 90014)
Am depitical apalysis of solar wind - pagmetusphere serray chepting justificas is reported. As empirical analysis of solar wind - paguatisphers herry coupling leastless is reported.

Weing the technique of linear prediction filluring with 2.5 minute data, we examine the reletionship of surfers lose geographet extivity to
solar wind power input functions which degreed on
the solar wind quantities VS. VP. As YE. In
this samiyaks a least squares prediction fillur
or impulse response function which relates a
solar wind power function which relates a
solar wind power function to a paveral lose gaomagnetic indux is designed directly from the
data. We find that the computed inpulse response
functions have the characteristics of a low pass
filler with a time delay which may be depumped
on the strength of the energy imput. While the
At index is treatment of the solar wind energy functions, the All index shows a substantially poorer relationship. In addition,
high frequency variations of the querial indicas

and some substorm expansions are not predictable with solar wind infortation alone suggesting that internal magnetospheric processes parabilly control the AL index. We along find that the sparecesses which depends on VAT in the solar wind has a paying relationship to surrelative actions of magnetic activity then a power parabolic form processing a VAT solar wind dependence.

WE solar wind dependence.

stophys, Pen. Lett., Paper 180915

Simb Majoratorphic Configuration

COMM PROSECTION 18 HATELA CASE CITUS

N. N. Paper (University of California, Los Alects

National Laboratory, Ind Stance, New Mexico

27041, E. W. Hore, Jr., P. R. Highe, S. D.

Palish, and P. Learning

At approximately 0100 UT on 20 Extentor 1878, a
large injection of energetic 1-10 bet) particles

was observed by los Alamos instrumentation octoned spacecraft 1976-079 (35% longitude) at
geostationary orbit. This injection was closely

sasociated with the onnext of a major substorm

falso at 4000 UT in Identified by many negative

bays in the Hocomponents of cagnetic records at
Lebrogue (22%) and Alamos snaturents bay at

0100 UT an the mid-latitude injection was closely

substormence of a positive M-temponent bay at

0100 UT an the mid-latitude injection and by a

0100 UT an the mid-latitude injection and by a

18-bound on 177M. This substorm expansion onset

18 to and (100 UT) by a pronounced

18 tretuning of the majorite field at synchronous

18 orbit into a testitie configuration and by a

18 declopment of highly digarilie (field-shignes)

18 declopment of highly digarilie (field-shignes)

18 declopment of highly cigarilie (field-shignes

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17.5 Places Secunditions. WANT-PARTIES FRANCISCO STREET First SMEAR FILETIVATIONS

S. P. Gary (SSO, MS-488, Lo. Micros With mil-Labor Cory, Los Alaros, St. 875-55 and J. L.

This paper presents calculated of transport to transport to transport on the transport of transport to transport to transport to transport to the transport transport to the transport transport to the transport transport to the transport transport transport of the measurement of the district transport of the measurement of the district of the measurement of the district of the second of the measurement of the district of the transport of the district of the district of the district of the measurement of the district of the di this paper presents calculate to of read port

Site Planta cotton, concertion, or a product of 5000 (2000s), 1 H1 (510) (2000) if proceeds the two screens of the two screens of the and between the Science, both as "Segure by, take 15%, by we have seed to be a science, both as the country of the science of t

Science, herata, "squire his, labor 15%, laptor is naturate. Best is deposited to the losinal innerphere in the course of enforcement of corotation to the ester magnetosphere. The future heating, rate as estimated for societal possible sources of departure from the constation in rading use of a simple coded of the ragnetosis. Following compression or expansion of the magnetosphere, the magnetospheric planta sportations or the total constation in consequence of conservation of the angular recentur, and thermal entry is deposited in the long-pheric at a rate of the order of 101-16 for about 10% see shill retainment speed is adjusted to-midthe corotation with the planet. Outsing diffusion of the loganic planta at a rate of 104-3 arg/s glic causes are replemented to diffusion of the loganic planta at a rate of 104-3 arg/s glic causes are replemented to diffusion of the loganic planta at a rate of 104-3 arg/s glic causes are constitued in the control of the caught of the state of the functional reposition of the caught of a similar magnetic diffusion of a similar magnetic see the rotational speed is adjusted continuality. Thus the corotation enforcement current formion all plants an important part in energiation and domainers of the Jovian magnetosphere. The heating rate per unit area of the high-latitude broughere is more than 10 erg/cm²-sec, marely, orders of magnitude greater than the rate of the enough supply by the solar UV radiation. These nurbers depend on the independent history, forther, investories, ecosphere, iouthing.

1. Seeplysia, each, Belley, Espan 181197

5760 Planes motion, convention, or circulation DEFUSION OF COLD MANASTORMERIC IONS T. J. Birmingham (MASA/Goddard Space Flight Conter. Leboratory for Extraterrestrial Physics, Greenbelt, Maryland 20171) T. G. Morthrop Va Greenbell, Naryland 20171) I. G. Northrop
We investigate conditions under which a
diffusion equation is a valid description of the
tremsport serous magnetic field lines of low
energy segmetospheric plasms. In this paper we
consider the uses where the guiding caster drift
by a clight, and in particular its fluctuating
emponent by, are comparable in size to the
particle thermal speed. We conclude that a two
dismationed diffusion equation is valid in the
e,s speed of the Roler potentials provided that
the surl of the total electric field component
parallel to B vasions (Trg[*f,\$]) s O] and
provided the fluctuations have a short enough
correlation time that guiding center drifts other
that y, remain angligible. Igns in Jupiter's lo
plant torus are thus described by a diffusion
equation of the correlation time is no more than
a far rotation periods of the planet.
J. Geophys. Ran., Blue, Faper 181053 THE CHARGERS OF SPACECRAPT SCREACES
N. B. CARCETE (Ast Propulsion Laboratory,
California Sentitute of Technology, 4800 Oak
Grows Dr., Fabrelena, CA 91303)
The buildup of etactic charge on satellite
surfaces is an important tosse in the utilization of astellite systems. The samiyais of the
phonomena has required important shousces in
basic charging theory and the development of
complex modes to avaisate the planear absolute
that durround satellites. The results of these
theories and calculations have vide application
is speen physics in the design of systems and
in the interpretation of low energy plassay
answerements.

measurements.
In this review, those supects of charge buildup on eatsilits surfaces relevant to butletp on establish surfaces relevant to the space physics commenty act summarized. The types of chatging processes, modeld of charge buildop, satellise shauth theories, and charging observations are described with sephanis or busic concepts. (Spacecraft charging, plasse.

measurements). Her. Geophys. Spece Phys., Paper 181000